WHAT IS CLAIMED IS:

1. A perfluoropolyether comprising perfluoroalkyl radical end groups having at least 3 carbon atoms per radical and is substantially free of perfluoromethyl and perfluoroethyl end groups, and 1,2-bis(perfluoromethyl)ethylene diradical [-$CF(CF_3)CF(CF_3)$-] is absent in the molecule.

2. A perfluoropolyether according to claim 1 wherein said perfluoroalkyl radical has 3 to 6 carbon atoms per radical.

3. A perfluoropolyether according to claim 1 wherein said perfluoropolyether has the formula of $C_rF_{(2r+1)}$-A-$C_rF_{(2r+1)}$; each r is independently 3 to 6; if r = 3, both end groups $C_rF_{(2r+1)}$ much be n-propyl radical; A is selected from the group consisting of $O\text{-}(CF(CF_3)CF_2\text{-}O)_w$, $O\text{-}(C_2F_4\text{-}O)_w$, $O\text{-}(C_2F_4\text{-}O)_x(C_3F_6\text{-}O)_y$, $O\text{-}(CF_2CF_2CF_2\text{-}O)_w$, and combinations of two or more thereof; w is 4 to 100; x, y, and z are each independently 1 to 100.

4. A composition comprising a perfluoropolyether, which comprises perfluoroalkyl radical end groups having at least 3 carbon atoms per radical and is substantially free of perfluoromethyl and perfluoroethyl end groups, and 1,2-bis(perfluoromethyl)ethylene diradical [-$CF(CF_3)CF(CF_3)$-] is absent in the molecule.

5. A composition according to claim 4 wherein said perfluoroalkyl radical has 3 to 6 carbon atoms per radical.

6. A composition according to claim 4 wherein said perfluoropolyether has the formula of $C_rF_{(2r+1)}$-A-$C_rF_{(2r+1)}$; each r is independently 3 to 6; if r = 3, both end groups $C_rF_{(2r+1)}$ much be n-propyl radical; A is selected from the group consisting of $O\text{-}(CF(CF_3)CF_2\text{-}O)_w$, $O\text{-}(C_2F_4\text{-}O)_w$, $O\text{-}(C_2F_4\text{-}O)_x(C_3F_6\text{-}O)_y$, $O\text{-}(CF_2CF_2CF_2\text{-}O)_w$, and combinations of two or more thereof; w is 4 to 100; x, y, and z are each independently 1 to 100.

7. A composition according to claim 4, 5, or 6 wherein said composition further comprises a thickener and said perfluoropolyether is present in said composition in the range of from about 0.1 to about 50 weight % based on said composition.

8. A composition according to claim 7 wherein said thickener is selected from the group consisting of poly(tetrafluoroethylene), fumed silica, and boron nitride, and combinations of two or more thereof.

9. A process comprising (1) contacting a perfluoro acid halide, a C_2 to C_4-substituted ethyl epoxide, a C_3^+ fluoroketone, or combinations or two or more thereof with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene or tetrafluorooxentane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) reducing said ester to its corresponding alcohol; (5) converting said corresponding alcohol with a base to a salt; (6) contacting said salt with a C_3^+ olefin to produce a prepolyether; and (7) fluorinating said prepolyether.

10. A process according to claim 9 wherein said C_3^+ olefin is a C_3-C_6 straight chain olefin, C_3-C_6 branched chain olefin, C_3-C_6 allyl halide, or combinations of two or more thereof.

11. A process according to claim 9 wherein said process comprises (1) contacting a perfluoro acid halide or a C_2 to C_4-substituted ethyl epoxide with a metal halide to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene or tetrafluorooxentane to produce a second acid halide; (3) esterifying said second acid halide to an ester; (4) contacting said ester with a Grignard reagent to produce a carbinol; and (7) dehydrating or fluorinating said carbinol.

12. A process according to claim 9 wherein said process comprises (1) contacting a perfluoro acid halide, a C_2 to C_4-substituted ethyl epoxide, a C_3^+ fluoroketone, or combinations or two or more thereof with a metal fluoride to produce an alkoxide; (2) contacting said alkoxide with hexafluoropropylene or tetrafluorooxentane to produce a second acid fluoride; (3) contacting said second

acid fluoride with lithium iodide to produce an acid iodide; and (4) fluorinating said prepolyether.

13. A process according to claim 12 wherein said process further comprises step (3a) reducing the iodide radical of said acid iodide to corresponding hydrogen radical before the fluorinating step (4).